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RIVANNA RESERVOIR, ALBERMARLE COUNTY, VIRGINIA

PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH
LABORATORY

JUNE 1975

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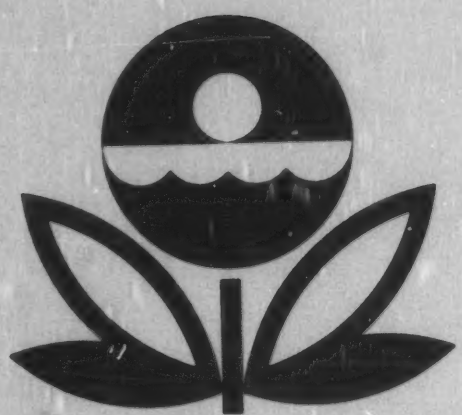
PB 253 094

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EUTROPHICATION SURVEY

WORKING PAPER SERIES



PACIFIC NORTHWEST ENVIRONMENTAL RESEARCH LABORATORY

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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT

ON

RIVANNA RESERVOIR

ALBEMARLE COUNTY

VIRGINIA

EPA REGION III

WORKING PAPER No. 466

WITH THE COOPERATION OF THE

VIRGINIA STATE WATER CONTROL BOARD

AND THE

VIRGINIA NATIONAL GUARD

JUNE, 1975

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to fresh water lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point-source discharge reduction and non-point source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's fresh water lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by EPA and to augment plans implementation by the states.

ACKNOWLEDGMENT

The staff of the National Eutrophication Survey (Office of Research & Development, U. S. Environmental Protection Agency) expresses sincere appreciation to the Virginia State Water Control Board for professional involvement and to the Virginia National Guard for conducting the tributary sampling phase of the Survey.

Eugene T. Jensen, Executive Secretary of the State Water Control Board; Michael A. Bellanca, Director; Jean W. Gregory, Pollution Control Specialist; and Robert W. Pitchford, Pollution Control Technician; Bureau of Surveillance and Field Studies; provided invaluable lake documentation and counsel during the Survey, reviewed the preliminary reports, and provided critiques most useful in the preparation of this Working Paper series.

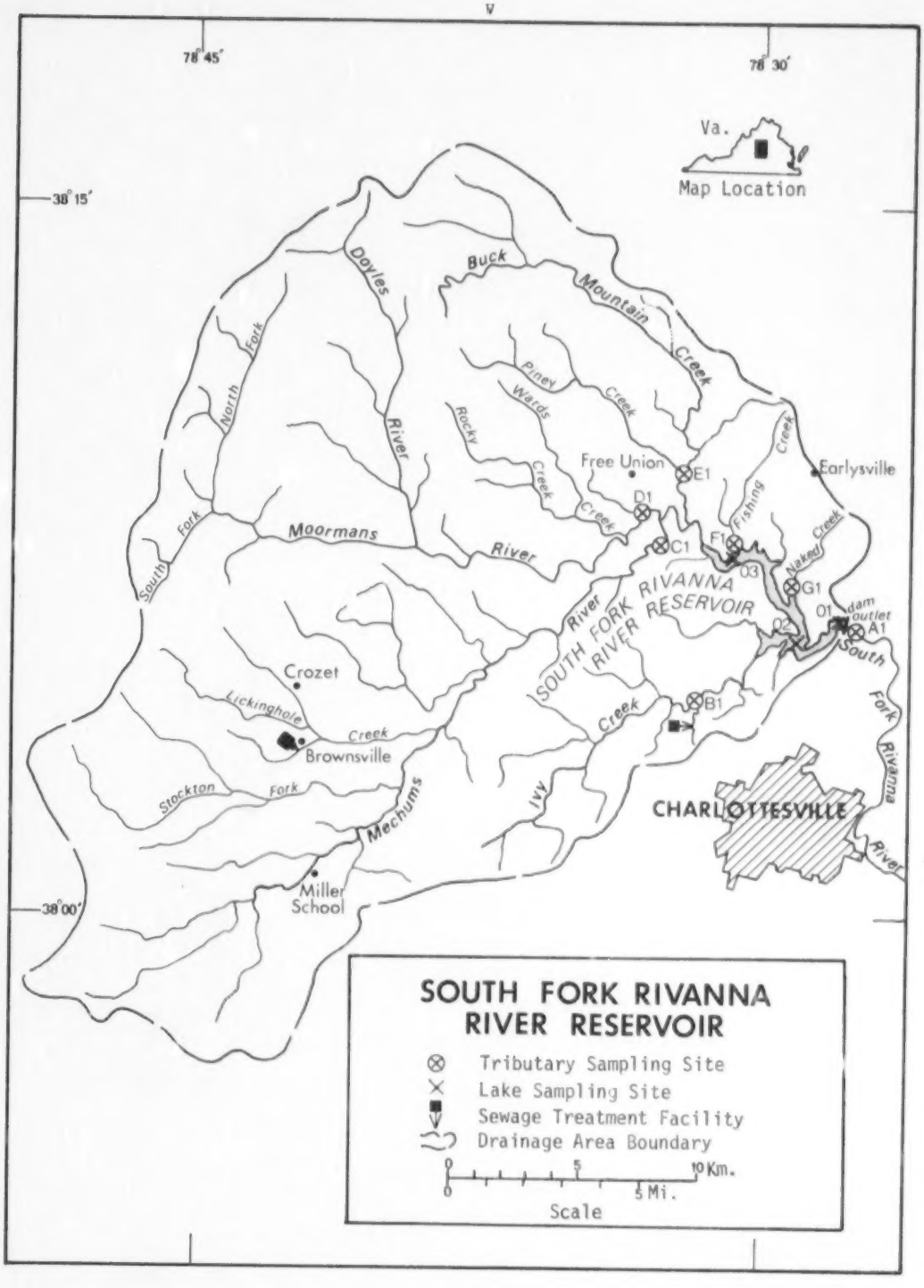
Major General William J. McCaddin, the Adjutant General of Virginia, and Project Officer Lt. Colonel James D. Manley, who directed the volunteer efforts of the Virginia National Guardsmen, also are gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY

STUDY LAKES

STATE OF VIRGINIA

LAKE NAME	COUNTY
Bluestone	Giles, VA; Mercer, Monroe, Summers, WV
Chesdin	Amelia, Chesterfield, Dinwiddie
Chickahominy	Charles City, New Kent
Claytor	Pulaski
J. H. Kerr	Charlotte, Hallifax, Micklenburg, VA; Granville, Vance, Warren, NC
J. W. Flannagan	Dickenson
Occoquan	Fairfax, Prince William
Rivanna	Albemarle
Smith Mountain	Bedford, Franklin, Pittsylvania


78° 45'
78° 30'
38° 15'
38° 00'
Va.
Map Location
Doyles River
Buck Mountain Creek
North Fork
South Fork
Moormans River
Piney Creek
Wards Creek
Rocky Creek
Free Union
Earlysville
Fishing Creek
Naked Creek
SOUTH FORK RIVANNA RIVER RESERVOIR
South River
South Fork Rivanna River
Crozet
Lickinghole Creek
Brownsville
Stockton Fork
Mechums
Ivy Creek
Miller School
CHARLOTTESVILLE
D1
E1
C1
F1
G1
O1
O2
O3
A1
B1
dam outlet
SOUTH FORK RIVANNA RIVER RESERVOIR
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
Drainage Area Boundary
0 5 10 Km.
0 5 Mi.
Scale

RIVANNA RESERVOIR

STORET NO. 5113

I. CONCLUSIONS

A. Trophic Condition:

Survey data indicate that Rivanna Reservoir is eutrophic. It ranked seventh in overall trophic quality when the eight Virginia lakes sampled in 1973 were compared using a combination of six parameters*. Six lakes had less median total phosphorus, median dissolved phosphorus, and median inorganic nitrogen; two had less mean chlorophyll a; and six had greater mean Secchi disc transparency. Depression of dissolved oxygen with depth occurred at sampling station 1 in July and September and at station 2 in July.

Survey limnologists noted an algal bloom at stations 2 and 3 in September.

B. Rate-Limiting Nutrient:

The algal assay results indicate the reservoir was phosphorus limited at the time the sample was taken (04/09/73). The reservoir data indicate phosphorus limitation at stations 1 and 2 and nitrogen limitation at station 3 at all sampling times.

C. Nutrient Controllability:

1. Point sources--During the sampling year, point sources contributed 9.0% of the total phosphorus load to the reservoir. Morton's Frozen Foods in Crozet accounted for 8.0%, and the

* See Appendix A.

Farmington Country Club accounted for 1.0% of the total. Other point sources are known, but it is not likely they were significant contributors to the total reservoir load during the sampling year (see page 11).

The present loading of 11.83 g/m^2/year is almost 12 times that proposed by Vollenweider (Vollenweider and Dillon, 1974) as a eutrophic loading (see page 15). Although Vollenweider's model may not be applicable to water bodies with short hydraulic rentention times, the present trophic condition of the reservoir is evidence of excessive nutrient loads.

Because the reservoir is phosphorus limited much of the time, all phosphorus inputs should be minimized to the greatest practicable extent. Phosphorus removal at the listed point sources should at least help slow the present rate of eutrophication of the reservoir. Further water quality improvement would be expected if a significant portion of the phosphorus export of Mechums River is controllable (see discussion below).

2. Non-point sources--The gaged tributaries were estimated to have contributed 91.0% of the total reaching the reservoir. Mechums River contributed nearly 71% of the total and had the highest export rate (see page 14). The 59 kg P/km^2/yr measured is more than twice the next highest rate (Fishing Creek, 29 kg P/km^2/yr) and may be indicative of unknown and unsampled point sources, particular land-use practices within the drainage, or underestimation of the listed point source loads. Additional

study is needed to determine the controllability of nutrient sources in the Mechums River Drainage.

II. LAKE AND DRAINAGE BASIN CHARACTERISTICS†

A. Lake Morphometry††:

1. Surface area: 1.82 kilometers^2.
2. Mean depth: 6.1 meters.
3. Maximum depth: >11.6 meters.
4. Volume: 11.102 x 10^6 m^3.
5. Mean hydraulic retention time: 16 days.

B. Tributary and Outlet:
(See Appendix C for flow data)

1. Tributaries -

Name	Drainage area (km^2)*	Mean flow (m^3/sec)*
Ivy Creek	56.7	0.7
Mechums River	256.7	3.0
Moormans River	193.0	2.2
Buck Mountain Creek	95.8	1.1
Fishing Creek	11.7	0.1
Naked Creek	8.2	0.1
Minor tributaries & immediate drainage -	49.5	0.6
Totals	671.6	7.8

2. Outlet -

South Fork, Rivanna River	673.4**	7.8

C. Precipitation***:

1. Year of sampling: 115.2 centimeters.
2. Mean annual: 112.1 centimeters.

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† Table of metric conversions--Appendix B.
†† Bellanca, 1975.
* For limits of accuracy, see Working Paper No. 175, "...Survey Methods, 1973-1976".
** Includes area of lake.
*** See Working Paper No. 175.

III. LAKE WATER QUALITY SUMMARY

Rivanna Reservoir was sampled three times during the open-water season of 1973 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from three stations on the lake and from a number of depths at each station (see map, page v). During each visit, a single depth-integrated (4.6 m or near bottom to surface) sample was composited from the stations for phytoplankton identification and enumeration; and during the first visit, a single 18.9-liter depth-integrated sample was composited for algal assays. Also each time, a depth-integrated sample was collected from each of the stations for chlorophyll a analysis. The maximum depths sampled were 11.6 meters at station 1, 8.8 meters at station 2, and 2.4 meters at station 3.

The sampling results are presented in full in Appendix D and are summarized in the following table.

A. SUMMARY OF PHYSICAL AND CHEMICAL CHARACTERISTICS FOR RIVANNA (SOUTH FORK) RES
STORET CODE 5113

PARAMETER	1ST SAMPLING (4/ 9/73) 3 SITES RANGE	MEAN	MEDIAN	2ND SAMPLING (7/19/73) 3 SITES RANGE	MEAN	MEDIAN	3RD SAMPLING (9/29/73) 3 SITES RANGE	MEAN	MEDIAN
TEMP (C)	11.0 - 12.4	11.7	11.6	23.5 - 26.4	25.3	25.8	20.9 - 23.5	22.7	23.0
DISS OXY (MG/L)	9.7 - 11.0	10.1	10.0	3.2 - 8.8	6.8	6.8	2.0 - 8.0	5.6	5.9
CNDCTVY (MCROMO)	50. - 50.	50.	50.	53. - 60.	56.	55.	57. - 250.	153.	147.
PH (STAND UNITS)	6.8 - 8.6	7.6	7.7	7.4 - 8.1	7.5	7.4	6.6 - 7.6	6.9	6.8
TOT ALK (MG/L)	10. - 17.	13.	12.	18. - 23.	21.	21.	18. - 22.	20.	20.
TOT P (MG/L)	0.066 - 0.216	0.119	0.092	0.023 - 0.123	0.060	0.037	0.040 - 0.165	0.076	0.060
ORTHO P (MG/L)	0.022 - 0.039	0.028	0.027	0.004 - 0.066	0.020	0.008	0.009 - 0.099	0.021	0.010
NO2+NO3 (MG/L)	0.370 - 0.670	0.481	0.420	0.160 - 0.420	0.292	0.275	0.130 - 0.400	0.191	0.180
AMMONIA (MG/L)	0.030 - 0.100	0.072	0.070	0.130 - 0.350	0.207	0.205	0.090 - 0.370	0.185	0.195
KJEL N (MG/L)	0.200 - 0.700	0.375	0.400	0.200 - 0.700	0.550	0.600	0.200 - 1.200	0.520	0.500
INORG N (MG/L)	0.400 - 0.770	0.553	0.485	0.290 - 0.720	0.499	0.520	0.230 - 0.580	0.376	0.395
TOTAL N (MG/L)	0.610 - 1.150	0.856	0.845	0.600 - 1.070	0.842	0.865	0.430 - 1.360	0.711	0.680
CHLRPYL A (UG/L)	2.7 - 7.7	5.1	5.0	3.1 - 12.1	6.4	3.9	1.8 - 15.9	8.5	7.8
SECCHI (METERS)	0.4 - 0.6	0.5	0.4	0.8 - 1.8	1.4	1.5	1.0 - 1.4	1.2	1.3

B. Biological characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
04/09/73	1. Fragilaria sp.	1,355
	2. Dinobryon sp.	376
	3. Melosira sp.	256
	4. Cryptomonas sp.	241
	5. Navicula sp.	196
	Other genera	814
	Total	3,238
07/19/73	1. Melosira sp.	191
	2. Flagellates	134
	3. Sphaerellopsis sp.	96
	4. Navicula sp.	96
	5. Ankistrodesmus sp.	38
	Other genera	76
	Total	631
09/29/73	1. Anabaena sp.	437
	2. Melosira sp.	368
	3. Cyclotella sp.	322
	4. Flagellates	276
	5. Microcystis sp.	92
	Other genera	140
	Total	1,635

2. Chlorophyll a -

Sampling Date	Station Number	Chlorophyll a (µg/l)
04/09/73	01	7.7
	02	2.7
	03	5.0
07/19/73	01	3.9
	02	3.1
	03	12.1
09/29/73	01	7.8
	02	15.9
	03	1.8

C. Limiting Nutrient Study:

1. Autoclaved, filtered, and nutrient spiked -

Spike (mg/l)	Ortho P Conc. (mg/l)	Inorganic N Conc. (mg/l)	Maximum yield (mg/l-dry wt.)
Control	0.035	0.490	8.9
0.050 P	0.085	0.490	11.7
0.050 P + 1.0 N	0.085	1.490	23.1
1.0 N	0.035	1.490	8.5

2. Discussion -

The control yield of the assay alga, Selenastrum capricornutum, indicates that the potential primary productivity of Rivanna Reservoir was quite high at the time the sample was collected (04/09/73). Also, a significant increase in yield when orthophosphorus alone was added indicates that the lake was phosphorus limited at that time. Note that the addition of nitrogen alone produced a yield no greater than that of the control.

The reservoir data indicate a combination of limiting nutrients; although it will be noted that station 3, nearest the nutrient point sources impacting the Mechum River, tended toward nitrogen limitation while stations 1 and 2, further away, tended towards phosphorus limitation.

Following is a tabulation of the mean inorganic nitrogen/orthophosphorus ratios for each of the stations and sampling times with the indicated limiting nutrient in parentheses.

Station	04/09/73	07/19/73	09/29/73
1	18/1 (P)	71/1 (P)	42/1 (P)
2	25/1 (P)	67/1 (P)	26/1 (P)
3	13/1 (N?)	9/1 (N)	6/1 (N)

IV. NUTRIENT LOADINGS
(See Appendix E for data)

For the determination of nutrient loadings, the Virginia National Guard collected monthly near-surface grab samples from each of the tributary sites indicated on the map (page v), except for the high runoff months of May and June when two samples were collected. Sampling was begun in July, 1973, and was completed in June, 1974.

Through an interagency agreement, stream flow estimates for the year of sampling and a "normalized" or average year were provided by the Virginia District Office of the U.S. Geological Survey for the tributary sites nearest the lake.

In this report, nutrient loads for sampled tributaries were determined by using a modification of a U.S. Geological Survey computer program for calculating stream loadings*. Nutrient loads shown are those measured minus point-source loads, if any.

Nutrient loads for unsampled "minor tributaries and immediate drainage" ("ZZ" of U.S.G.S.) were estimated using the means of the nutrient loads, in $kg/km^2/year$, at station D-1, E-1, and G-1 and multiplying the means by the ZZ area in km^2.

Nutrient loads from the town of Crozet, Morton's Frozen Foods, and Murray Manufacturing were calculated using nutrient concentrations and corresponding flow data provided by the Virginia Water Control Board (Godfrey, 1976). Nutrient loads for Miller School, Brownsville, and Acme Visible Records, all of which discharge intermittently, are

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* See Working Paper No. 175.

not included in the following tables because it is not likely these sources contributed significant amounts during the sampling year.

The operator of the Farmington Country Club wastewater treatment plant provided too few monthly effluent samples and corresponding flow data to permit calculation of nutrient loads, so the loads were estimated at 1.134 kg P and 3.401 kg N/capita/year.

A. Waste Sources:

1. Known municipal† -

Name	Pop. Served	Treatment	Mean Flow (m^3/d)	Receiving Water
Farmington Country Club††	250	ext. aer.	94.6*	Ivy Creek
Brownsville	?	ext. aer.	151.0** (intermittent discharge)	Slabtown Branch/ Lickinghole Creek
Crozet	40	none	15.1*	Powell's Creek/ Lickinghole Creek
Miller School	100-200	none	75.7* (intermittent discharge)	Miller Branch/ Mechums River

2. Known industrial† -

Name	Type Waste	Treatment	Mean Flow (m^3/d)	Receiving Water
Mortons Frozen Foods, Crozet	food processing	none	1,099.2	Trib. of Lickinghole Creek
Murray Mfg., Earlysville	-	none	1.3	Trib. of S. Fk. Rivanna River
Acme Visible Records, Crozet	-	none	28.4 (intermittent discharge)	Trib. of Lickinghole Creek

† Godfrey, 1976.
†† Gregory, 1973.
* Estimated at 0.3785 m^3/capita/day.
** Design flow.

B. Annual Total Phosphorus Loading - Average Year:

1. Inputs -

Source	kg P/ yr	% of total
a. Tributaries (non-point load) -		
Ivy Creek	1,070	5.0
Mechums River	15,255	70.9
Moormans River	1,505	7.0
Buck Mountain Creek	790	3.6
Fishing Creek	335	1.6
Naked Creek	105	0.5
b. Minor tributaries & immediate drainage (non-point load) -	480	2.2
c. Known municipal STP's -		
Farmington Country Club	220	1.0
Brownsville	?	-
Crozet	10	<0.1
Miller School	?	-
d. Septic tanks - Unknown	?	-
e. Known industrial -		
Morton's Frozen Foods	1,720	8.0
Murray Mfg.	5	<0.1
Acme Visible Records	?	-
f. Direct precipitation* -	30	0.2
Total	21,525	100.0

2. Outputs -

Lake outlet - S. Fk., Rivanna R. 13,945

3. Net annual P accumulation - 7,580 kg.

* See Working Paper No. 175.

C. Annual Total Nitrogen Loading - Average Year:

1. Inputs -

Source	kg N/yr	% of total
a. Tributaries (non-point load) -		
Ivy Creek	29,640	11.3
Mechums River	117,435	44.8
Moormans River	54,630	20.8
Buck Mountain Creek	28,345	10.8
Fishing Creek	4,785	1.8
Naked Creek	2,970	1.1
b. Minor tributaries & immediate drainage (non-point load) -	15,530	5.9
c. Known municipal STP's -		
Farmington Country Club	130	0.1
Brownsville	?	-
Crozet	165	0.1
Miller School	?	-
d. Septic tanks - Unknown	?	-
e. Known industrial -		
Morton's Frozen Foods	6,525	2.5
Murray Mfg.	10	<0.1
Acme Visible Records	?	-
f. Direct precipitation* -	1,965	0.8
Total	262,130	100.0

2. Outputs -

Lake outlet - S. Fk., Rivanna R. 276,455

3. Net annual N loss - 14,325 kg.

* See Working Paper No. 175.

D. Mean Annual Non-point Nutrient Export by Subdrainage Area:

Tributary	kg P/km²/yr	kg N/km²/yr
Ivy Creek	19	523
Mechums River	59	457
Moormans River	8	283
Buck Mountain Creek	8	296
Fishing Creek	29	409
Naked Creek	13	362

E. Yearly Loads:

In the following table, the existing phosphorus loadings are compared to those proposed by Vollenweider (Vollenweider and Dillon, 1974). Essentially, his "dangerous" loading is one at which the receiving water would become eutrophic or remain eutrophic; his "permissible" loading is that which would result in the receiving water remaining oligotrophic or becoming oligotrophic if morphometry permitted. A mesotrophic loading would be considered one between "dangerous" and "permissible".

Note that Vollenweider's model may not be applicable to water bodies with short hydraulic retention times.

	Total Phosphorus		Total Nitrogen	
	Total	Accumulated	Total	Accumulated
grams/m^2/yr	11.83	4.16	144.0	loss*

Vollenweider phosphorus loadings ($g/m^2/yr$) based on mean depth and mean hydraulic retention time of Rivanna Reservoir:

"Dangerous" (eutrophic loading)	2.20
"Permissible" (oligotrophic loading)	1.10

* There was an apparent loss of nitrogen during the sampling year. This may have been due to nitrogen fixation in the lake, solubilization of previously sedimented nitrogen, recharge with nitrogen-rich ground water, or unknown and unsampled point sources discharging directly to the lake. Whatever the cause, a similar nitrogen loss has occurred at Shagawa Lake, Minnesota, which has been intensively studied by EPA's former National Eutrophication and Lake Restoration Branch (Malueg et al., 1975).

V. LITERATURE REVIEWED

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VI. APPENDICES

APPENDIX A

LAKE RANKINGS

LAKES RANKED BY INDEX NOS.

RANK	LAKE CODE	LAKE NAME	INDEX NO
1	5105	JOHN W. FLANNAGAN DAM	507
2	5103	CLAYTOR LAKE	378
3	5110	SMITH MOUNTAIN LAKE	358
4	5112	CHICKAHOMINY LAKE	315
5	5111	LAKE CHESDIN	285
6	5106	JOHN H. KERR RESERVOIR	271
7	5113	RIVANNA (SOUTH FORK) RES	213
8	5108	OCCOQUAN RESERVOIR	72

LAKE DATA TO BE USED IN RANKINGS

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P
5103	CLAYTOR LAKE	0.031	0.450	439.500	5.642	14.900	0.008
5105	JOHN W. FLANNAGAN DAM	0.011	0.320	415.700	5.955	14.800	0.004
5106	JOHN H. KERR RESERVOIR	0.044	0.290	458.937	8.833	15.000	0.009
5108	OCCOQUAN RESERVOIR	0.098	0.525	459.750	12.417	15.000	0.037
5110	SMITH MOUNTAIN LAKE	0.016	0.410	419.667	11.593	15.000	0.005
5111	LAKE CHESDIN	0.044	0.240	465.778	12.556	14.800	0.008
5112	CHICKAHOMINY LAKE	0.066	0.125	455.333	13.600	9.400	0.017
5113	RIVANNA (SOUTH FORK) RES	0.079	0.475	460.222	6.667	13.000	0.022

PERCENT OF LAKES WITH HIGHER VALUES (NUMBER OF LAKES WITH HIGHER VALUES)

LAKE CODE	LAKE NAME	MEDIAN TOTAL P	MEDIAN INORG N	500-MEAN SEC	MEAN CHLORA	15-MIN DO	MEDIAN DISS ORTHO P	INDEX NO
5103	CLAYTOR LAKE	71 (5)	29 (2)	71 (5)	100 (7)	43 (3)	64 (4)	378
5105	JOHN W. FLANNAGAN DAM	100 (7)	57 (4)	100 (7)	86 (6)	64 (4)	100 (7)	507
5106	JOHN H. KERR RESERVOIR	43 (3)	71 (5)	43 (3)	57 (4)	14 (0)	43 (3)	271
5108	OCCOQUAN RESERVOIR	0 (0)	0 (0)	29 (2)	29 (2)	14 (0)	0 (0)	72
5110	SMITH MOUNTAIN LAKE	86 (6)	43 (3)	86 (6)	43 (3)	14 (0)	86 (6)	358
5111	LAKE CHESDIN	57 (4)	86 (6)	0 (0)	14 (1)	64 (4)	64 (4)	285
5112	CHICKAHOMINY LAKE	29 (2)	100 (7)	57 (4)	0 (0)	100 (7)	29 (2)	315
5113	RIVANNA (SOUTH FORK) RES	14 (1)	14 (1)	14 (1)	71 (5)	86 (6)	14 (1)	213

APPENDIX B

CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107×10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX C

TRIBUTARY FLOW DATA

TRIBUTARY FLOW INFORMATION FOR VIRGINIA 02/05/76

LAKE CODE 5113 S F RIVANNA RIVER RESERVOIR

TOTAL DRAINAGE AREA OF LAKE(SQ KM) 673.4

TRIBUTARY	SUB-DRAINAGE AREA(SQ KM)	NORMALIZED FLOWS(CMS) JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
5113A1	673.4	8.78	10.48	15.01	12.74	9.34	6.23	3.68	5.95	3.68	4.25	5.95	7.65	7.80
511381	56.7	0.71	0.96	1.30	1.10	0.71	0.45	0.25	0.71	0.23	0.28	0.48	0.59	0.65
5113C1	256.7	3.40	4.25	5.66	4.81	3.68	2.41	1.44	2.27	1.42	1.70	2.27	2.83	3.00
5113D1	193.0	2.55	3.11	4.25	3.68	2.66	1.76	1.05	1.64	0.99	1.19	1.70	2.21	2.23
5113E1	95.8	1.22	1.87	2.21	1.84	1.25	0.79	0.45	0.76	0.42	0.54	0.82	1.05	1.10
5113F1	11.7	0.14	0.20	0.28	0.23	0.14	0.08	0.03	0.08	0.03	0.06	0.08	0.11	0.12
5113G1	8.2	0.08	0.14	0.20	0.17	0.08	0.06	0.03	0.06	0.03	0.03	0.06	0.08	0.08
5113ZZ	50.5	0.62	0.85	1.16	0.96	0.62	0.40	0.23	0.37	0.20	0.25	0.42	0.54	0.55

SUMMARY

TOTAL DRAINAGE AREA OF LAKE = 673.4
SUM OF SUB-DRAINAGE AREAS = 672.6

TOTAL FLOW IN = 93.04
TOTAL FLOW OUT = 93.73

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5113A1	7	73	4.70	15	4.90				
	8	73	5.86	12	2.83				
	9	73	2.83	9	2.55				
	10	73	7.70	7	4.81				
	11	73	6.14	11	5.61				
	12	73	21.66	8	8.50				
	1	74	15.29	13	13.73				
	2	74	7.93	10	7.93				
	3	74	8.72	10	5.52				
	4	74	9.91	19	7.22				
	5	74	8.21	5	5.24	24	5.38		
	6	74	7.31	2	15.86	17	7.79		
511381	7	73	0.67	15	0.74				
	8	73	0.84	12	0.40				
	9	73	0.41	9	0.40				
	10	73	1.08	7	0.57				
	11	73	0.87	11	0.79				
	12	73	2.75	8	0.91				
	1	74	1.98	13	1.76				
	2	74	1.19	10	1.19				
	3	74	1.13	10	0.71				
	4	74	1.27	19	0.93				
	5	74	1.05	5	0.68	24	0.71		
	6	74	0.96	2	2.04	17	1.02		

TRIBUTARY FLOW INFORMATION FOR VIRGINIA 02/05/76

LAKE CODE 5113 S F RIVANNA RIVER RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5113C1	7	73	1.85	15	1.50				
	8	73	2.32	12	1.13				
	9	73	1.12	9	0.99				
	10	73	2.94	7	1.73				
	11	73	2.35	11	2.18				
	12	73	8.27	8	3.11				
	1	74	5.95	13	5.24				
	2	74	3.06	10	3.00				
	3	74	3.34	10	2.04				
	4	74	3.74	19	2.72				
	5	74	3.11	5	1.98	24	2.04		
	6	74	2.78	2	5.95	17	2.97		
5113D1	7	73	0.66	15	0.76				
	8	73	0.82	12	0.40				
	9	73	0.40	9	0.31				
	10	73	1.05	7	0.74				
	11	73	0.85	11	0.76				
	12	73	2.97	8	1.13				
	1	74	2.15	13	1.90				
	2	74	1.10	10	1.08				
	3	74	1.22	10	0.76				
	4	74	1.39	19	1.02				
	5	74	1.13	5	0.74	24	0.76		
	6	74	1.02	2	2.24	17	1.08		
5113E1	7	73	0.52	15	0.54				
	8	73	0.65	12	0.31				
	9	73	0.31	9	0.28				
	10	73	0.84	7	0.54				
	11	73	0.67	11	0.62				
	12	73	2.38	8	0.91				
	1	74	1.70	13	1.50				
	2	74	0.91	10	0.88				
	3	74	0.96	10	0.59				
	4	74	1.08	19	0.79				
	5	74	0.88	5	0.57	24	0.59		
	6	74	0.79	2	1.73	17	0.85		
5113F1	7	73	0.09	15	0.11				
	8	73	0.11	12	0.06				
	9	73	0.06	9	0.06				
	10	73	0.14	7	0.08				
	11	73	0.12	11	0.11				
	12	73	0.42	8	0.16				
	1	74	0.30	13	0.26				
	2	74	0.15	10	0.15				
	3	74	0.17	10	0.10				
	4	74	0.19	19	0.14				
	5	74	0.15	5	0.10	24	0.10		
	6	74	0.14	2	0.30	17	0.15		

TRIBUTARY FLOW INFORMATION FOR VIRGINIA 02/05/76

LAKE CODE 5113 S F RIVANNA RIVER RESERVOIR

MEAN MONTHLY FLOWS AND DAILY FLOWS(CMS)

TRIBUTARY	MONTH	YEAR	MEAN FLOW	DAY	FLOW	DAY	FLOW	DAY	FLOW
5113G1	7	73	0.07	15	0.06				
	8	73	0.08	12	0.03				
	9	73	0.04	9	0.03				
	10	73	0.10	7	0.06				
	11	73	0.08	11	0.08				
	12	73	0.30	8	0.12				
	1	74	0.22	13	0.19				
	2	74	0.11	10	0.11				
	3	74	0.12	10	0.07				
	4	74	0.14	19	0.10				
	5	74	0.11	5	0.07	24	0.07		
	6	74	0.10	2	0.22	17	0.11		

APPENDIX D

PHYSICAL and CHEMICAL DATA

STORET RETRIEVAL DATE 76/02/05

511301
38 05 42.0 078 28 08.0
RIVANNA (SOUTH FORK) RESERVOIR
51003 VIRGINIA

11EPALES 2111202
3 0042 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/09	12 00	0000	12.4		15	50K	7.80	17	0.060	0.400	0.420	0.026
	12 00	0006	12.3	10.3		50K	7.90	16	0.060	0.200K	0.420	0.036
	12 00	0016	12.0	10.2		50K	6.80	17	0.060	0.200K	0.410	0.023
	12 00	0025	11.8	10.0		50K	7.40	17	0.060	0.200	0.410	0.026
	12 00	0038	11.6	9.9		50K	7.80	17	0.080	0.200	0.410	0.023
73/07/19	10 25	0000	26.2		60	59	7.40	18	0.260	0.600	0.320	0.008
	10 25	0005	25.9	6.8		57	7.40	19	0.230	0.600	0.280	0.004
	10 25	0015	25.7	4.4		57	7.40	22	0.260	0.600	0.270	0.008
	10 25	0035	24.3	3.2		60	7.50	23	0.350	0.700	0.370	0.013
73/09/29	10 10	0000	23.2		50	57	6.80	20	0.210	0.400	0.180	0.010
	10 10	0005	23.0	5.2		58	6.80	19	0.220	0.500	0.180	0.010
	10 10	0015	23.0	6.0		60	6.70	21	0.220	0.500	0.190	0.009
	10 10	0025	22.8	4.2		60	6.60	20	0.260	0.500	0.180	0.011
	10 10	0035	22.1	2.0		63	6.60	22	0.370	0.500	0.210	0.013

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/09	12 00	0000	0.087	7.7
	12 00	0006	0.080	
	12 00	0016	0.078	
	12 00	0025	0.080	
	12 00	0038	0.098	
73/07/19	10 25	0000	0.037	3.9
	10 25	0005	0.029	
	10 25	0015	0.038	
	10 25	0035	0.077	
73/09/29	10 10	0000	0.042	7.8
	10 10	0005	0.049	
	10 10	0015	0.052	
	10 10	0025	0.069	
	10 10	0035	0.085	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/05

511302
38 06 18.0 078 29 18.0
RIVANNA (SOUTH FORK) RESERVOIR
51003 VIRGINIA

11EPALES
3

2111202
0033 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/09	12 30	0000	11.8		15	50K	7.80	12	0.080	0.700	0.450	0.022
	12 30	0006	11.6	9.9		50K	7.40	10	0.100	0.500	0.620	0.028
	12 30	0015	11.5	9.7		50K	7.80	10	0.100	0.500	0.610	0.030
	12 30	0022	11.5	10.0		50K	7.40	10K	0.100	0.400	0.610	0.030
	12 30	0029	11.5	9.9		50K	7.70	10K	0.100	0.400	0.670	0.030
73/07/19	11 10	0000	26.4		72	54	7.40	21	0.160	0.600	0.210	0.005
	11 10	0005	26.2	7.4		54	7.40	21	0.200	0.700	0.260	0.007
	11 10	0015	26.0	4.0		55	7.40	21	0.210	0.400	0.230	0.007
73/09/29	10 25	0000	23.5		54	250	7.00	18	0.090	0.600	0.140	0.010
	10 25	0005	23.3	5.8		250	6.90	20	0.100	0.500	0.140	0.010
	10 25	0012	23.2	6.0		230	6.80	20	0.180	0.300	0.130	0.010

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/09	12 30	0000	0.097	2.7
	12 30	0006	0.177	
	12 30	0015	0.197	
	12 30	0022	0.216	
	12 30	0029	0.172	
73/07/19	11 10	0000	0.023	3.1
	11 10	0005	0.028	
	11 10	0015	0.031	
73/09/29	10 25	0000	0.040	15.9
	10 25	0005	0.046	
	10 25	0012	0.071	

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 76/02/05

511303
38 07 29.0 078 30 47.0
RIVANNA (SOUTH FORK) RESERVOIR
51003 VIRGINIA

11EPALES
3

2111202
0012 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00010 WATER TEMP CENT	00300 DO MG/L	00077 TRANSP SECCHI INCHES	00094 CNDUCTVY FIELD MICROMHO	00400 PH SU	00410 T ALK CACO3 MG/L	00610 NH3-N TOTAL MG/L	00625 TOT KJEL N MG/L	00630 NO2&NO3 N-TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P
73/04/09	13 00	0000	11.0		24	50K	8.00	11	0.040	0.500	0.370	0.039
	13 00	0007	11.0	11.0		50K	7.70	11	0.030	0.300	0.370	0.022
73/07/19	11 35	0000	25.0		30	53	8.10	21	0.130	0.700	0.160	0.026
	11 35	0004	23.9	8.0		53	7.50	21	0.140	0.200K	0.400	0.066
	11 35	0008	23.5	8.0		54	7.60	22	0.130	0.400	0.420	0.061
73/09/29	10 40	0000	22.0	8.0	38	250	7.60	20	0.100	1.200	0.160	0.030
	10 40	0005	20.9	7.6		250	6.90	20	0.100	0.200K	0.400	0.099

DATE FROM TO	TIME OF DAY	DEPTH FEET	00665 PHOS-TOT MG/L P	32217 CHLRPHYL A UG/L
73/04/09	13 00	0000	0.066	5.0
	13 00	0007	0.083	
73/07/19	11 35	0000	0.123	12.1
	11 35	0004	0.108	
	11 35	0008	0.111	
73/09/29	10 40	0000	0.165	1.8
	10 40	0005	0.146	

K VALUE KNOWN TO BE
LESS THAN INDICATED

APPENDIX E

TRIBUTARY and WASTEWATER TREATMENT PLANT DATA

STORET RETRIEVAL DATE 75/03/26

5113A1
38 06 02.0 078 27 43.0
S FORK RIVANNA RIVER
51039 7.5 E CHARLOTTES
O/S FORK RIVANN RIVER RE
US 29 BRDG 3 MI NE OF CHARLOTTESVILLE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	11	17	0.230	0.580	0.210	0.010	0.075
73/08/12	10	00	0.240	0.300	0.120	0.012	0.055
73/09/09	11	55	0.198	0.740	0.290	0.009	0.065
73/10/07	15	00	0.270	1.230	0.180	0.019	0.095
73/11/11	09	45	0.500	1.300	0.130	0.021	0.090
73/12/08	11	15	0.312	0.800	0.064	0.020	0.067
74/01/13	10	46	0.552	0.200	0.032	0.020	0.050
74/02/10	14	30	0.410	1.100	0.025	0.010	0.045
74/03/10	14	45	0.360	0.700	0.025	0.015	0.060
74/04/19	17	46	0.088	0.200	0.015	0.010	0.040
74/05/05	15	35	0.080	0.600	0.070	0.010	0.040
74/05/24	17	35	0.252	2.600	0.195	0.005	0.055
74/06/02	16	45	0.168	1.200	0.125	0.005K	0.030
74/06/17	18	57	0.084	0.300	0.075	0.005K	0.030

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

511381
38 04 30.0 078 31 57.0
IVY CREEK
51 7.5 W CHARLOTTES
T/S FORK RIVANN RIVER RE
RT 654 BRDG 1.5 NW OF HESSIAN HILLS
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	09 30		0.680	0.300	0.034	0.012	0.055
73/08/12	08 11		0.710	0.420	0.029	0.030	0.150
73/09/09	12 28		0.640	0.100K	0.022	0.021	0.050
73/10/07	13 05		0.740	0.750	0.069	0.016	0.045
73/11/11	08 15		0.820	1.050	0.100	0.046	0.055
73/12/08	09 30		0.760	0.300	0.020	0.016	0.045
74/01/13	09 05		0.980	0.400	0.022	0.012	0.035
74/02/10	12 30		1.010	1.100	0.025	0.005	0.025
74/03/10	13 16		0.800	0.600	0.025	0.010	0.045
74/04/19	15 55		0.588	0.200	0.010	0.027	0.045
74/05/05	13 59		0.616	1.000	0.045	0.010	0.030
74/05/24	16 25		0.680	2.900	0.150	0.022	0.090
74/06/02	15 00		0.570	1.000	0.082	0.035	0.450
74/06/17	17 30		0.560	0.400	0.035	0.025	0.120

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5113C1
38 07 16.0 078 33 00.0
MECHUMS RIVER
51 7.5 FREE UNION
I/S FORK RIVANN RIVER RE
RT 601 BRDG 2 MI SSE OF FREE UNION
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	09	51	0.430	0.320	0.030	0.130	0.160
73/08/12	08	27	0.610	0.630	0.037	0.231	0.290
73/09/09	13	15	0.380	0.370	0.026	0.230	0.250
73/10/07	13	25	0.570	0.750	0.040	0.168	0.230
73/11/11	08	27	0.550	0.850	0.078	0.154	0.195
73/12/08	09	50	0.470	0.400	0.026	0.092	0.160
74/01/13	09	19	0.630	0.100	0.020	0.068	0.100
74/02/10	12	50	0.672	1.500	0.020	0.075	0.130
74/03/10	13	30	0.520	1.700	0.035	0.195	0.250
74/04/19	16	16	0.330	0.200	0.010	0.145	0.145
74/05/05	14	15	0.276	0.300	0.020	0.138	0.178
74/05/24	16	35	0.360	2.800	0.105	0.101	0.140
74/06/02	15	14	0.460	1.400	0.390	0.100	0.145
74/06/17	17	45	0.384	0.200	0.010	0.085	0.145

STORET RETRIEVAL DATE 75/03/26

511301
38 08 28.0 078 33 25.0
MOORMANS RIVER
51 7.5 FREE UNION
I/S FORK RIVANN RIVER RE
RT 601 BRDG 1.25 MI SSE OF FREE UNION
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	10 09		0.126	0.350	0.015	0.011	0.040
73/08/12	08 37		0.076	0.400	0.022	0.015	0.045
73/09/09	13 35		0.120	0.350	0.168	0.030	0.060
73/10/07	13 35		0.147	1.650	0.061	0.014	0.025
73/11/11	08 35		0.154	0.850	0.079	0.011	0.011
73/12/08	11 00		0.132	0.300	0.020	0.008	0.035
74/01/13	09 26		0.260	0.400	0.016	0.020	0.020
74/02/10	10 00		0.200	0.600	0.015	0.005K	0.005
74/03/10	13 40		0.060	0.700	0.020	0.005	0.010
74/04/19	16 30		0.048	0.200	0.010	0.010	0.010
74/05/05	14 25		0.040	1.300	0.120	0.010	0.010
74/05/24	16 45		0.060	0.800	0.050	0.012	0.020
74/06/02	15 26		0.192	0.700	0.060	0.010	0.015
74/06/17	17 54		0.084	0.100K	0.010	0.010	0.015

K VALUE KNOWN TO BE
LESS THAN INDICATED

35

STORET RETRIEVAL DATE 75/03/26

5113E1
38 09 15.0 078 32 30.0
BUCK MOUNTAIN CREEK
51 7.5 FREE UNION
T/S FORK RIVANN RIVER RE
RT 665 BRDG 1.5 MI E OF FREE UNION
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	10	22	0.270	0.580	0.018	0.012	0.055
73/08/12	08	48	0.210	0.100K	0.018	0.011	0.040
73/09/09	13	50	0.154	0.460	0.023	0.016	0.040
73/10/07	13	45	0.160	0.800	0.044	0.010	0.020
73/11/11	08	45	0.280	0.750	0.042	0.009	0.020
73/12/08	10	37	0.368	0.400	0.024	0.008	0.030
74/01/13	09	40	0.450	0.200	0.012	0.008	0.015
74/03/10	13	50	0.164	0.400	0.015	0.005K	0.015
74/04/19	16	38	0.132	0.100	0.025	0.005	0.010
74/05/05	14	35	0.120	0.500	0.035	0.005	0.005
74/05/24	16	55	0.116	1.800	0.090	0.007	0.020
74/06/02	15	40	0.288	1.100	0.330	0.020	
74/06/17	18	05	0.168	0.300	0.020	0.010	0.011

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

511361
38 06 46.0 078 29 29.0
NAKED CREEK
51 7.5 E CHARLOTTES
T/S FORK RIVANN RIVER RE
BANK AT END OF RD 2 MI SW OF RIVANN
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	11 00		0.168	0.520	0.069	0.007	0.040
73/08/12	09 30		0.180	0.580	0.058	0.026	0.050
73/09/09	14 30		0.130	0.345	0.037	0.011	0.035
73/10/07	14 30		0.150	2.500	0.730	0.013	0.035
73/11/11	09 25		0.250	1.000	0.072	0.015	0.065
73/12/08	11 02		0.168	0.200	0.028	0.005K	0.060
74/01/13	10 25		0.320	0.450	0.040	0.016	0.050
74/02/10	13 50		0.260	1.600	0.030	0.025	0.050
74/03/10	14 27		0.100	1.400	0.030	0.005K	0.040
74/04/19	17 18		0.028	0.600	0.042	0.005	0.035
74/05/05	15 05		0.084	0.600	0.050	0.010	0.025
74/05/24	17 20		0.152	2.300	0.135	0.011	0.055
74/06/02	16 10		0.144	0.800	0.070	0.010	0.011
74/06/17	18 41		0.052	0.500	0.015	0.005	0.006

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5113F1
38 07 46.0 078 30 58.0
FISHING CREEK
51 7.5 FREE UNION
T/S FORK RIVANN RIVER RE
RT 660 BRDG 3.5 MI SW OF EARLYVILLE
11EPALES 2111204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P
73/07/15	10 37		0.033	1.000	0.026	0.016	0.090
73/08/12	09 05		0.012	2.200	0.037	0.036	0.290
73/09/09	14 06		0.013	2.300	0.026	0.048	0.198
73/10/07	14 00		0.280	0.350	0.030	0.026	0.075
73/11/11	08 59		0.240	0.600	0.044	0.011	0.035
73/12/08	10 46		0.148	0.500	0.028	0.005K	0.040
74/01/13	09 55		0.352	0.200	0.028	0.012	0.025
74/02/10	13 30		0.384	1.400	0.035	0.045	0.062
74/03/10	14 05		0.160	1.800	0.108	0.005K	0.025
74/04/19	16 57		0.104	0.200	0.020	0.005	0.020
74/05/05	14 50		0.156	0.600	0.025	0.050	0.105
74/05/24	17 05		0.156	2.450	0.120	0.031	0.067
74/06/02	15 56		0.152	1.000	0.300	0.015	0.115
74/06/17	18 21		0.104	0.400	0.010	0.010	0.080

K VALUE KNOWN TO BE
LESS THAN INDICATED

STORET RETRIEVAL DATE 75/03/26

5113BA AS5113BA P000250
38 03 53.0 078 32 02.0
FARMINGTON COUNTRY CLUB CHARLOTT
51039 7.5 CHALOTTSVILL
T/S FK RIVANNA RIVER RES
IVY CREEK
11EPALES 2141204
4 0000 FEET DEPTH

DATE FROM TO	TIME OF DAY	DEPTH FEET	00630 NO2&NO3 N-TOTAL MG/L	00625 TOT KJEL N MG/L	00610 NH3-N TOTAL MG/L	00671 PHOS-DIS ORTHO MG/L P	00665 PHOS-TOT MG/L P	50051 FLOW RATE INST MGD	50053 CONDUIT FLOW-MGD MONTHLY
74/05/10	10 00								
CP(T)-			3.840	3.800	0.730	15.700	19.000	0.013	0.013
74/05/10	16 00								
74/08/08	10 00								
CP(T)-			0.680	6.100	0.050K	9.000	10.000	0.018	0.016
74/08/08	14 30								
74/09/27	10 00								
CP(T)-			2.700	3.500	0.070	12.000	12.500	0.007	0.007
74/09/27	14 00								
74/10/29	14 00		1.600	6.300	0.270	12.000	12.000	0.013	0.017
74/11/26	09 00								
CP(T)-			0.080	11.000	3.500	12.000	13.000	0.008	0.006
74/11/26	15 00								

K VALUE KNOWN TO BE
LESS THAN INDICATED

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